Mykolaivcement Dry Line Plant, Ukraine

Non-Technical Summary

Plan Design Enable

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Contents

1. Introduction

Background

OJSC Mykolaivcement ("the Company") is considering the construction and operation of a new cement manufacturing facility at Mykolaiv in Western Ukraine (about 25km south-east of Lviv). This document provides a summary of the environmental and social changes that may occur due to the planned development of the new dry-process line cement plant. The summary considers the construction, operation and eventual closure of the new dry-line plant, and the associated development of an access road, railway extension, gas pipeline and the re-wiring of the existing electricity line. The proposed facility will replace the existing wet-process line plant and this summary also considers the environmental impacts associated with the closure of the existing facility.

The European Bank for Reconstruction and Development (EBRD, "the Bank"), is considering whether it will take an equity share in the Company with Lafarge (who own OJSC Mykolaivcement) to contribute to the financing of the construction, and operation of a new cement dry process line. It is a policy requirement of both the Bank and the Company to fully assess the potential environmental and social impacts of such projects and a formal, independent Environmental and Social Appraisal has been completed for the Mykolaivcement project. The purpose of this Non-Technical Summary is to provide everyone that may be interested in the Project with information on the benefits of the Project as well as the potential impacts and how they should be managed. Both the Bank and the Company are committed to demonstrating that the Project will be delivered to international best practice standards and not just basic legal compliance.

This Non-Technical Summary, the companion Environmental and Social Action Plan and the full Environmental and Social Appraisal report are published by the Bank and the Company as part of a formal public disclosure and consultation process. Comments from interested individuals or organisations are welcome.

The publication of this Summary goes beyond the requirements of the local Environmental Impact Assessment (EIA) or OVNS and should be read with the published Stakeholder Engagement Plan (SEP). The SEP describes how anyone interested in the project can make their opinions known to the Company.

How cement is made

The cement manufacturing process begins with the heating of calcium carbonate (found in limestone, chalk and other minerals) to produce calcium oxide (lime); this process is called calcining and gaseous carbon dioxide is released at this point. The calcium oxide is then heated again with silica, alumina and iron oxide to form clinker, in the sintering process. The clinker is then ground (called milling) with gypsum and other additives to form cement.

There are four main methods used to manufacture cement:

1. wet process – raw materials (often with a high water content) are milled in water to form a slurry which is then either fed directly into a long kiln or is dried prior to entering the kiln
2. semi-wet process - slurry is dewatered in filter presses and the resulting filter cake is either extruded into pellets and fed to a travelling grate pre-heater or fed directly to a filter cake drier for (dry) raw meal production prior to a pre-heater/ pre-calciner kiln.
3. semi-dry process - dried ground material (raw meal) is mixed with water to form lumps which are, then dried and partly calcined in a grate pre-heater; or in some cases, in a long kiln;
4. dry process - raw meal is preheated in a series of cyclones, in modern designs there is then a pre-calcining stage, followed by a rotary kiln where final calcination and sintering occurs.

The choice of process is largely determined by the moisture content of the raw material and then by energy costs. Wet processes consume more energy per unit output than dry processes, as they have to drive off the moisture in the kiln. The traditional wet line process has an average specific energy consumption of

around 6,000-6,500 MJ/tonne clinker, whereas for a modern dry process with cyclone pre-heater this will be 3,000-4,000 MJ/tonne clinker. In addition, lower fuel combustion (among other factors) means that dry-line plants have lower air emissions than wet-line processes.

Where raw material properties allow, dry line processes are generally regarded as the most appropriate technology for modern cement plant.

A diagram of a generic dry-line cement production process is given in Annex 1.

Project Description

Proposed development

The proposed site for the new facility is adjacent to Lafarge's Dobryansky limestone quarry which supplies crushed stone to the existing cement plant at Mykolaiv, approximately 10 km north. The new facility will have a total production capacity of 2.1 Mt of cement annually and is due to begin production in 2015. Lafarge have stated that the new dry line (DL) will replace the entire existing plant, with a short change-over period in late 2015.

The plant is of modern design and includes with energy and process efficiency measures to ensure recovery and re-use of production wastes and heat, as well as technology to control emissions. The new dry cement line will be constructed by an equipment supplier/ construction contractor (under a turnkey contract) and a construction camp will be established on site during the construction period.

The development will require the extension of an existing railway line from the gypsum quarry (approx.5 km to the north-west) and a new road link to the main Kiev-Chop highway (approx 5km to the east).

Existing plant

The area has a long history of cement production and the existing Mykolaivcement plant has been operating since 1950. The facility produces cement using a long-kiln wet line process in which limestone and additive slurry from existing quarries are heated in kilns to form clinker, which is then ground with other additives to form cement. The company has four rotary kilns, with an output of 0.85 Mt of cement in 2010.

Need for the development and alternatives considered

The existing plant is aging and uses old technology which is inefficient and produces a high-cost clinker, has product quality problems and requires significant investment to maintain its operation. The plant has significant adverse environmental impacts, particularly on local residents who are in close proximity to the plant. The plant is unlikely to meet future Ukrainian legislative emission limits without very high levels of investment and as a consequence it has been decided to close the facility in 2015.

The Company completed a market study to establish the demand for cement in Ukraine to confirm the basic need for a new manufacturing facility. Having established the need and the size of the cement market, the Company considered where the new facility should be located, its production capacity and the manufacturing technology to be used. Three locations considered:

1. Within the existing site – this was dismissed due to the proximity of nearby houses, the need to transport limestone over a long distance and because production would cease during the demolition/construction period;
2. Within the existing Dobryansky limestone quarry – this had the advantages of being close to the limestone source, being within the existing land ownership , the principal raw material in cement manufacture, however ground conditions were not considered suitable, there are restrictions on building in low-lying areas, and local villages would be within the sanitary zone for the plant.
3. Next to the existing processing plant at the Dobryansky limestone quarry. This was the favoured option due to the proximity to the quarry, more suitable ground conditions, and nearby villages would be outside the sanitary protection zone

For each location the Company considered the available cement manufacturing process designs and assessed them against a range of technical, financial, environmental and social criteria, The options considered were an upgrade of the existing wet process, a new semi-wet process and new dry process; the favoured option was a new dry-line facility.

In 2008 Lafarge produced proposals to develop a similar new dry line and commenced licensing and permit applications. However, the world economic downturn coincided with these proposals, and Lafarge took the decision not to proceed with the planned development. The proposals were re-examined in 2010 when the economy in Ukraine and other surrounding states started to recover, and the present proposals were developed.

Site Characteristics

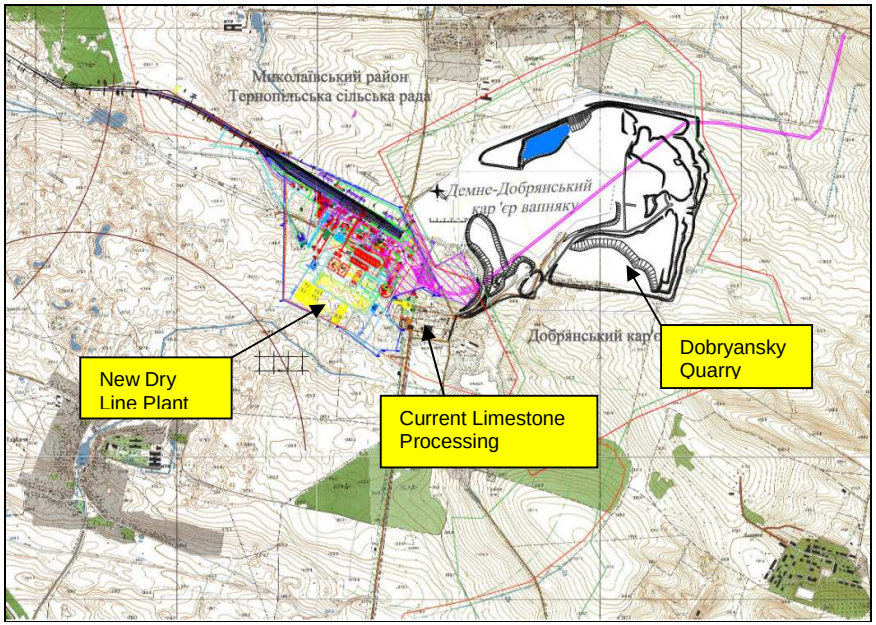
The proposed site adjacent to the Dobryansky quarry comprises some 92 ha of undeveloped land. The area is characterised by low limestone hills with large expanses of grassland, widely spaced treelines and some areas of woodland and forest. There are scattered villages, surrounded by more intensively managed fields.

The site is located immediately to the west and north-west of the existing Dobryansky limestone quarry production facility. Dobryany village is located 1.8 km to the north, the main Kyiv-Chop highway lies 4.0 km to the east, The villages of Gayi and Lypivka lie to the south-east at 1.1 km and 3.2 km respectively, Gorbachi village is to the south west at a distance of 1.1 km and to the west is farm land, and Popelyany village at 2.2 km distance.

The railway from Shchiretz will be extended beyond the existing clay quarry to cross approximately 5km of farmland to join the site from the north-west. The line of the gas pipeline is not finalised, but will either follow the existing underground slurry pipelines which run south to the existing plant, or it will come into the plant from the east, from a pressure-reducing station near Brodyi, close to the Kiyv-Chop highway.

It is considered likely that a standard Sanitary Protection Zone (SPZ) of 1km will be imposed by the Ukrainian authorities. There are no known residential properties or other sensitive receptors within 1km of the proposed dry line facility, although there are two commercial operations (a brick factory and lime kiln) and a small pig-rearing farm within this zone.

Figure 1 – General Location of the New Dry Line Plant



Project Phasing

The proposed project timescales are shown in Table 1:

Table 1 – Main Project Programme Elements

Phase	Date
Lafarge decision to proceed with Mykolaiv dry-line project	December 2011
Submit OVNS for construction permit	October 2011
Conduct consultations for construction permit (and EBRD disclosure consultations)	Dec 2011 / Jan 2012
Obtain construction permit for dry-line plant	August 2012
Commence site preparation (activities that do not require a construction permit)	Spring 2012
Commence Construction (34-36 months, including site preparation)	Sept 2012
Commence commissioning	Q2 2015
Commence full production at new plant	Q4 2015
Cease production at existing plant	Q4 2015

As the previous project was fairly well developed in 2009 some permissions and agreements have been obtained before. The Company is in the process of establishing exactly which permissions, technical conditions and land allocations are still valid and which require re-application.

The OVNS produced in 2009 is in the process of being updated to reflect design and other changes; it expected to be submitted in the autumn of 2011.

Separate construction permits (and OVNS) are likely to be sought for the rail and gas supplies as these plans are less well advanced than the main dry line plant and access road proposals.

Construction Programme

The main contractor is yet to be appointed; the construction programme cannot be developed until the final contractor is selected. The planned construction period is up to 36 months, including 9 months for pre-construction preparatory works. The following tasks will then be undertaken:

- Site clearance, levelling and fill importing/ exporting;
- Construction of the living quarters (construction companies camps);
- Construction of warehouses and storage areas;
- Site roads, utility and services connections (drainage, water supply, heat supply, electrical supply);
- Earthworks and foundation works;
- Installation of building structures and equipment;
- Building fitting-out, and
- Commissioning.

Construction Camp

There will be a peak of around 1,200 personnel during construction. The camp is currently envisaged to consist of approximately 15 single-storey living blocks and canteen blocks, a shop, medical station and site office.

Potable water will be provided from existing boreholes; effluent treatment will be provided by new package plant (this will later be used for the final site domestic sewage treatment).

Contractor and construction phase control

The main contractor is likely to be a Chinese construction company, and the majority of the workforce will be foreign, supplemented by some local contractors. Lafarge have experience of working with Chinese contractors in other developments around the world and apply Lafarge standards to control health & safety, social and environmental impacts at their construction sites. These requirements are built into the contract, will be controlled by Lafarge site management and will be regularly audited by Lafarge centre staff.

The development and early phase of construction of the new plant will be managed by the Mykolaivcement general manager and technical project manager, supported by a site manager and general design manager. The broad operational management structure for the new plant has been developed and staff will be recruited in, starting approximately 2 years prior to operation.

OSJC Mykolaivcement will develop health & safety, quality and environmental management systems to control the construction phase of the development; these management systems are then likely to be taken over by the new site operations management team, who will develop and extend it to cover commissioning and operational phases. The management systems will be implemented according to Lafarge standards, and will be subject to regular audits.

2. New Plant Process Technology

The new dry process cement plant is designed to comply with Ukrainian legislative requirements, BAT and Lafarge internal standards for cement plants. More detailed information on the design of the facility and comparison against EU Best Available Techniques (BAT) and Ukrainian standards is provided within the BAT assessment section of the ESAR.

General

The new facility is a dry-process clinker production and Portland cement mixing process, using multistage cyclone pre-heating and a pre-calciner. This is a modern design of plant, generally considered to represent international best practice (BAT) for new cement manufacturing facilities. The footprint of the new facility is relatively small and has been designed to minimise the distances between processing lines, raw materials storage and warehouses and unloading facilities but leaving space for further extension.

The automatic process control system means that fewer operating personnel are required, in comparison with the existing plant. There are anticipated to be 250 personnel on site, working a 3 shift system. Plant operation is 24 hours a day, 330 days a year. Product shipping is envisaged to take place 5 days a week on 2 shifts (14 hours a day).

The facility will produce 5 types of cement, and will consist of the following operations:

Raw materials storage and handling

Limestone from the adjacent quarry is crushed at the existing crusher plant and stored in a circular blending bed. Other raw materials (gypsum, clay, iron, additive, fly ash, slag) and solid fuels (coal, shredded municipal/industrial wastes, tyres) will be brought in primarily by rail with some road transport. Clinker and cement product will be exported by rail and road.

Raw mix additives will be stored in an enclosed building on an asphalt pad to prevent leaching of pollutants to ground. Fly-ash cement additive is pneumatically unloaded from trucks or trains and stored in 3 steel silos of 3,000m^3 capacity.

Clay is mined at Kaguevsky quarry where it is transformed into slurry, transported through the existing pipeline to Dobryansky quarry workshop, where it will be de-watered using a new filter press. The clay cake will then transported to the raw mill feed hopper. Alternatives to using slurry have been investigated, however, no practicable transportation alternatives were identified due to landscape and poor public infrastructure.

Coal is the primary fuel used in the kiln. It will be brought in by rail, transferred by covered belt conveyor to a covered store of 6,000 tonnes or an external open winter store of 24,000 tonnes. The ground covering for the open store is to be determined in discussion with the authorities; Ukrainian standards prohibit the use of asphalt, so at present compacted hardcore is proposed.

Coal is ground in a ball mill; hot air from the dedicated natural gas-fired hot gas generator (HGG) is used to dry the coal. Exhaust gas from the coal mill is recycled to the HGG and finally routed via bag filter to stack discharge;

The raw meal mill is fed from five bins (limestone, clay/loam, iron ore, wet ash or sand and gypsum) in an enclosed building with weigh feeders. Kiln exhaust gases as well as clinker cooler exhaust gases will be used to dry the raw materials going into the raw mill; auxiliary hot gas generators (gas fired) are

used either to augment the exhaust gases or provide drying when the kiln is not in operation.

Clinker production

Raw meal is fed into the cyclone pre-heater. This consists of a double string of five cyclones to pre-heat the raw meal, making beneficial use if the hot exhaust gases from the clinker production process. The heated raw meal then enters the pre-calciner to calcine the raw meal (convert the calcium carbonate in the limestone to calcium oxide and carbon dioxide).

The pre-calciner will be fired on alternative fuels (AF), consisting of shredded tyres and shredded solid municipal/industrial waste. Initial proposals are for alternative fuels to make up 25% of the total thermal energy use in clinker production, rising to 40%. The kiln burners will also be designed to allow firing on alternative fuels. Two-level low NOx (oxides of nitrogen) burners are installed. Selective non-catalytic reduction (SNCR) will be installed for NOx removal;

The material leaving the pre-calciner then enters the kiln to complete the calcination process and production of the cement clinker. It is designed for 5,000 t/day clinker production and is supported on three piers. The kiln burner will be fired on coal, although AF can be used in future. Gas is used as a fuel on start-up;

The hot clinker leaving the kiln is air-cooled in a grate type cooler which discharges clinker to a storage silo. Exhaust gases from the clinker cooler are de-dusted in two cyclones with the dust returned to the clinker conveyor. The hot exhaust gases are then used to supply heated air for drying the raw mill feed;

The main bag filter plant will remove particulates from the exhaust gases from the pre-heater, raw meal grinding and clinker cooler and discharge via the main stack. Other local emission points have their own dust abatement plant; these are bag filters in all cases.

Cement production

Cement additives are stored with raw meal additives. There are two cement grinding systems, each supplied by four feed bins for clinker, slag, gypsum and limestone. The grinding mills consist of one roller-press and one ball mill in closed circuit with a high-performance separator. Fly ash is added at the output of the ball mill before the separator. Some cement additives (limestone and gypsum) have a high moisture content, so the mill feed is dried by hot gasses from a natural-gas fired hot gas generator at each mill. The grinding buildings are enclosed for weather and noise protection. There are two main air emissions points at each mill workshop; the air stream is de-dusted using bag filters and discharged through two separate stacks.

Cement product is stored in 5 concrete silos, each of 6000t capacity with de-dusting for the silos and dispatch systems for bulk loading of railway cars and road tankers.

There will be two packing lines filling 25 kg bags, which are palletised and stored in a covered open sided warehouse for loading by forklift truck onto road or rail transport. The packing lines will be de-dusted via bag filters.

Auxiliary buildings are for services such as the laboratory, mechanical and electrical workshop, railway maintenance, offices and stores.

Table 3 – Operational Capacity of the New Dry-Line Plant

Parameter	Capacity (tonnes)	
	Hour	Year
Raw meal production	335 (320 t/h wet for clinker production)	2,500,000 (2,430,000 wet for clinker production)
Clinker production	208 (5,000 tonnes/day)	1,592,225
Cement production	440	2,100,000

Raw Material Consumption and Reserves

The consumption of energy will be as follows:

- Annual coal consumption: 140,000 – 240,000 tonnes
- Annual natural gas consumption: 18,400,000 Nm^3
- Electricity consumption: 220 million KWh/year

The quantity and reliability of the supply of wastes that can be used as Alternative Fuels (AF) in Ukraine is poor at present. Lafarge is in the process of identifying sources of suitable wastes around Lviv. It is likely that suitable wastes will be sorted and shredded at a landfill site in Lviv (to remove the majority of halogenated and heavy-metal containing wastes) and then to transport the shredded waste to the site by lorry for use as AF. An AF storage and dosing plant is included in the plant design.

Utilities

Operational water demand is 1,652 m^3/day for domestic, industrial water and re-circulation top-up. This water demand will be supplied by the existing boreholes and the River Zubra supply is within the existing maximum permitted abstraction quantities. New water supply and sewerage networks are to be provided for the new dry-line plant. The use of a re-circulation system is regarded as BAT and reduces site waste use.

The existing plant uses an average of 2,736m^3/day. The new dry-line process uses far less water than the existing wet process, as the limestone feed material is not turned into a slurry for transportation. This has the positive environmental impact that the existing abstractions from the Zubra River will be reduced and the existing Mykolaiv site boreholes will no longer be used.

Domestic effluent will be gravity fed to the package domestic sewage treatment facilities which using biological treatment and ultraviolet disinfection. Treated effluent is then discharged the unnamed tributary of the River Shchirka.

Rainwater and melt water from the site is collected by drainage channels and passed through a treatment plant (a settlement tank and oil separators) before being discharged to the no-name tributary of the River Shchirka.

The existing twin electricity lines coming into the quarry site will be used as the electricity supply for the new site and will continue to supply the quarry. The supply cables and insulators will be replaced, but there will be no overall change to the appearance or dimensions of the supply line.

There are two options currently being considered for natural gas supply. The favoured option is to construct a supply pipeline from the from the gas reducing station near Brodyi village on the national distribution pipeline which runs alongside the Kiev-Chop highway, some 4km to the east of the plant. This has the disadvantage that excavations will be required to lay the new pipeline and the line will go across future reserves of the quarry, meaning that it may have to be re-routed in future.

The alternative gas supply option is to feed a gas pipeline through or alongside the existing slurry tunnels from the existing Mykolaivcement plant gas supply. This option has the advantage that it will follow the existing slurry pipelines, although it has the disadvantages of being longer and requiring the continued use of a gas supply station on the Mykolaivcement site and will constrain future use and disposal of the site.

New Plant Process Technology Review (BAT Assessment)

The proposed technology, management techniques and emissions of the proposed dry-line plant was assessed against the EU BAT Reference Document for the cement industry. The assessment confirms that the process design for the new dry line plant is in line with the requirements of BAT. In particular the use of a dry line process will substantial reduce the energy requirements of the facility. The Mykolaiv facility will have a thermal energy consumption to around 3,280 MJ/tonne clinker, which is within the BAT range of 3,000 - 4,000 MJ/tonne. This compares favourably with the thermal energy use in the existing wet process of 6,600 MJ/tonne.

Emissions to air are in line with EU BAT as well as Ukrainian Order 23 emission limits for plants using coal as the fuel source.

Emissions to air when alternative fuels will be used as a part fuel source are also in line with BAT and the EU Waste Incineration Directive (which is also reflected in Order 23). However, as there is little information available on the proposed pre-treatment of waste to demonstrate that the WID emission limits

can be complied with the ESAP requires further characterisation of locally available wastes.

Fugitive emissions to air will be generally contained within process buildings or covers. Conveyors and material transfer points are de-dusted using bag filters. The use of a dry process instead of wet or semi-dry means that there are no significant process emissions to water or sewer.

The company is implementing the Lafarge Health and Safety and Environmental Management Systems at the existing site, and plans to extend this system to the new site. Lafarge management systems are not formally certified to EN ISO 14001 or OHSAS 18001, however, they mirror the requirements of these international standards and the company is periodically audited by Lafarge Technical Centre.

Lafarge proposes to have continuous emissions monitoring on the main stack for dust, CO, NO_x and SO_2. CEMS for dust will also be provided on the mill stacks. This represents BAT.

Decommissioning of New Plant

The operational life of the new dry-line cement plant will be in excess of 50 years. The actual length of operation will be determined by local supplies of raw materials, future technological change and prevailing market conditions.

When the decision to close the plant and associated quarries is made, details of how the plant will be decommissioned will be determined and a site closure plan will be agreed with the local regulators. As this point is anticipated to be many years in the future, it is not possible to determine the exact decommissioning technique(s) that will be used and the contents of the plan.

Decommissioning of the Existing Plant

The existing plant decommissioning is due to start shortly after production ceases in Q4 2015. No site closure or decommissioning plans have been developed yet: the development of these is an action item identified in the ESAP. At present, Lafarge intend on selling off the equipment they can, and sell the site. The end-use that the site will be put to is not known and will have to be agreed with the local communities.

3. Background Environmental Conditions

Climate and Air Quality

The climate of Mykolaiv district is reported to be moderately humid. Average temperature is +7.9℃ ranging from -32.2℃ to +37℃ . Annual precipitation is 650-700 mm, most falling in July, August and September. Snow cover is more or less constant from mid November until mid March. Snow cover is normally 10 -12 cm deep, but can reach 25-40 cm. South-easterly, westerly, and north-westerly winds dominate throughout the year.

The air quality at the proposed site is not known (no monitoring has been thought necessary by the local authority) but is expected to be good due to the rural location. It is expected that the air quality will be effected by traffic using the Kiev-Chop road, the existing quarry operations and potentially by emissions from the existing Mykolaivcement plant (although as this is over 10km away) but that the effects are likely to be minor.

Geology and groundwater

The surface geology consists of loam to sandy loam/clay soils interspersed with sand lenses and sand to a depth of 7m. This is underlain with clay to a depth of up to 30m. The clay is underlain by chalk and limestone, interspersed with marls and clays. Gypsum is also present in the area.

Previous geological surveys have shown the presence of karst caverns underlying the site in the transition zone between limestone and gypsum. This issue must be taken into account in the design of foundations to avoid construction collapse risk and any connected environmental/ human health risk.

Groundwater is present at a depth of 0.5 – 1.4 m in the sandy soils. There are also two lower levels of groundwater contained within the underlying solid geology; both aquifers are under artesian pressure.

Hydrology

The main surface water bodies in the area are the river Dniester and its tributaries – the river Shchirka to the west of the dry-line site and the river Zubra, which lies over 10km to the south, flowing past the existing Mykolaivcement plant.

The site slopes gradually from north-east to south-west and naturally drains to a small stream and then to a tributary of the River Shchirka. Drainage water from the quarry and process effluent from the quarry operations is discharged to this small stream. The levels of pollutants in the small stream and River Shchirka were reported in the OVNS; suspended solids in both waterbodies exceed the relevant Ukrainian limits. However, the OVNS states that the water quality within the River Shchirka is within Ukrainian standards.

The southern part of the site becomes waterlogged; this will be drained as part of the project, although the land is not used for the operational phases.

Ecology and ecological protected areas

There are no sites of nature conservation at or in the immediate vicinity of the dry-line site. The closest national nature park is "Skolivski Beskydy", located about 45 km south-west of Mykolaiv. The presence of protected areas close to the route of the railway line, access road and gas pipeline will be established during the preparation of the OVNS for these elements.

The flora of the dry-line plant site can be classified into areas of semi-improved grassland and wet grassland. The reported fauna of the area includes various common species of bird and a range of mammals. No site-specific information on ecology at the site is available, including information on invertebrates, reptiles, amphibians or bats.

Noise and vibration

Baseline noise measurements have been undertaken in the area of the existing plant. Measured noise levels at the edge of the nearest residential areas are in the range 40-42 db(A) without the quarry workshop operating and in the range 40-43 dB(A) with the quarry workshop and crusher operating. These are within applicable Ukrainian noise limits.

Cultural history and archaeology

There is a protected archaeological site within the proposed development site designated on the basis of a find of pottery fragments and flints. The plant layout has been arranged to avoid disturbing this area in construction or operation.

The presence of any protected cultural heritage sites near to the route of the infrastructure will be established during the preparation of the OVNS for these elements.

Transport

A village road runs north-south between the Dobriansky quarry and the dry-line site on an elevated embankment. This road will not be used in operation, although it will continue to be used for the first year or so of site preparation and construction before the main plant access road is constructed. The road is currently in use for quarry vehicles moving from the Company garage to the quarry and the main quarry road crosses this public road. The existing road and two bridges over small streams are likely to require upgrading if it is to be used for construction traffic.

There will be two vehicle entrances in the north east corner of the site – one for site traffic (which will become the main site entrance) and one entrance for construction traffic (which will be closed after construction has ceased). The route of the plant access road is planned to be approximately 5 km in length, running from the north-east of the site across the restored area of the quarry and then turn north, alongside a drainage ditch to join an existing road between Dobryany village and the Kiev-Chop highway for 1km. The new road will be a two lane asphalt-surfaced road and will be made available for public use.

The existing single-line railway from the station at Shchiretz to the Shchiretz gypsum quarry is planned to be extended by approximately 5km to enter the site from the north-west. The railway will be constructed on across agricultural land. The closest settlement is Popelyany, which is within 200 m of the railway at its closest point.

It is predicted that 50% of product will be exported by road and 50% will be exported by rail.

The airport in Lviv is located about 23 km to the north of the site. It is understood that the construction of a new 120m stack was agreed with International Airport Lviv and the Ukrainian Air Force for the 2008 proposals, although no response was revived form the Ukrainian civil aviation body; these bodies are being consulted again for the current proposals.

Socio-Economic Environment

Both the existing and proposed plant are located in the Mykolaivsky district which is located in the south-eastern part of Lviv region. The population of the Mykolaivsky district is 65,900. It has the third highest population density in the region. The population is primarily rural with 67% living in the countryside, and 33 % living in urban areas.

The three settlements closest to the new plant are Dobryany, Gayi and Gorbachi villages. All these settlements are more than 1km away from the site. Gayi is the closest settlement, 1.1km to the southeast of the plant, consisting of approximately 20 houses.

There is very limited data about the health status of the population in the District and around the project area. Local Authorities report that public health indicators remain stable but more detailed information is not publicly available. Similarly information on educational status of the population and the distribution of schools was not available. This information will be collected later in the project.

The main industries in the district economy are the production of construction materials, construction and transport services and agriculture. Over the last 15 years the industrial output of the Mykolaivsky region has declined. In July 2011 there were 1,241 registered unemployed people at the District Job Office, an increase of 25.3% from the year before.

OJSC “Mykolaivcement” is the largest employer in the town providing employment for over 500 people. There are few other industrial enterprises in Mykolaiv.

The public infrastructure in the surrounding area to the project is poor and relatively underdeveloped, and is dependent on Mykolaivcement for development funding.

Land ownership

The land for the new plant is state owned, controlled by Ternopillya village council. OJSC “Mykolaivcement” has acquired the lease of this land for 49 years from the council. Although the land is leased there are still agricultural activities taking place on the land.

The adjacent land which will be required for the transport and utilities connections is owned by the Dmytry, Brodky and Ternopillya village councils and the neighbouring Pustomyty District. There may also be separate private owners of the land.

There is no publically-available register of land owners in Ukraine, so the Company will need to identify the owners of the adjacent land required for infrastructure connections. This process will start once the rail design is validated. The Company have undertaken to carry out this research (in line with national requirements and the EBRD Performance Requirement 5: Land acquisition, involuntary resettlement and economic livelihood displacement).

Employment

At the existing Mykolaivcement plant, white collar employees (i.e. management level and specialists) make up 30% of the total staff and blue collar (i.e. skilled and unskilled labour) constitute 70% of staff. The majority of the employees (90%) at Mykolaivcement are members of the trade union which is part of the larger Building Materials Workers Union. The average salary at Mykolaivcement is 4,273 UAH (approximately 378 Euro). This is higher than the average salary of 2,319 UAH (approximately 205 Euro) in the Lviv region and the average salary in the cement industry in Ukraine.

Mykolaivcement has been optimising its operations over the last few years and the number of employees at the existing plant is predicted to steadily decrease to 334 in 2014. Although some of these employees will among the 250 employed at the new plant, not all of them will be employed.

Health and Safety at the existing plant

The Company employs a team of occupational health and safety specialists and has a medical centre on site. Safety procedures are established in line with Lafarge corporate requirements and Ukrainian legislative requirements. The company is implementing a H&S management system, which will be in place by the end of 2011.

The number of reported accidents at Mykolaivcement is relatively low. One minor injury has been recorded to date in 2011,

4. Environmental and Social Impacts

Emissions to air

Construction impacts

Construction activities have the potential to affect air quality due to dust raised by earthworks, construction activities, wind-whipping from storage piles and from vehicle exhausts. The main site-based air emission sources were modelled as part of the 2009 OVNS.

This predicted that emissions for all modelled substances would be below the applicable Ukrainian air quality limit values at the edge of the SPZ (set at 1,000 m for such construction projects).

The model did not include dust and combustion pollutants arising from transport of materials to and from the site. It is likely that the existing village roads will be used for construction traffic for the first 12 months of construction until the access road is built. This will involve a significant increase in traffic on these roads. The impact is still to be quantified, however, the impacts will be temporary as the new road should be constructed within 12 months, and as construction activities will be taking place in daylight hours there will not be emissions during the night-time.

Once the new access road is operational traffic is routed away from the local villages and onto the Kiev-Chop road, which does not have residential properties in such close.

Dust arisings from the construction of the railway and gas line have not been quantified. The ESAP contains to assess these impacts further.

Proposed mitigation measures

The following control measures are proposed to control construction phase dust emissions:

- minimising site stripping;
- construction roads will be arranged to follow the route of the permanent site roads where practical; these roads will be hard surfaced and regularly cleaned
- temporary construction roads will be regularly damped down
- the batching plant cement silos will be fitted with bag filters.
- open stores of dust-generating materials will be damped down;
- site speed limits will be enforced.

Operational impacts

Key emission points from the dry- process plant are: the main stack, serving the kiln, calciner and preheater exhaust and the raw mill; the coal mill; the cement mill classifiers and limestone crusher and conveyors, packaging line emissions and external stockpiles.

The general primary measures undertaken at the new dry line facility to prevent or minimise emissions to air are:

- process control using fully automated and computer controlled systems;
- 5 stage cyclone heat exchangers and reuse of hot gas in grinding and milling operations and preheating and pre-calcination of kiln feed;
- natural gas heating for plant start-up and flame ignition;
- low sulphur and nitrogen containing raw materials, and
- storing the majority of raw materials in covered stores and minimising external stockpile use; and
- using covered conveyors and de-dusting transfer points through bag filters; and
- regular cleaning of site roads to reduce fugitive dust emissions.

Air dispersion modelling was carried out for the 2011 OVNS. The modelling was based on emissions from the main plant at either legislative limits or design terms of reference. In the absence of measured background concentrations of air pollutants, the Lviv Region State Administration of Environment Protection supplied proxy values to be used in modelling (these were 40% of the air quality standard).

The predicted maximum ground level concentrations of the modelled polluting substances at the border of the standard 1 km sanitary protection zone (SPZ) of new production facility are shown in Table 4.

Table 4 – Summary of Predicted Maximum Concentrations (MPC) at the SPZ Boundary

Substance	Peak allowable MPC, (mg/m^3)	Background (mg/m^3)	Background plus predicted maximum concentration on the border of SPZ (mg/m^3)
Nitrogen dioxide	0.2	0.034	0.16
Sulphur dioxide	0.5	0.2	0.36
Carbon monoxide	5.0	2	2.2
Particulates	0.5	0.2	0.5

No modelled ground level concentrations exceed the MPC at the SPZ boundary, however predicted levels of particulates are at the MPC on the southern and south-western parts of the SPZ boundary (at other parts of the boundary they are lower). Levels of NO_2 and SO_2 are, respectively, 0.8 and 0.7 of the MPC on the SPZ boundary. The predicted concentrations of other substances (heavy metals, hydrogen chloride, hydrogen fluoride, total organic carbon) on the border of the SPZ are not predicted to be more than 0.55 of the MPC and will be near to the assumed background concentrations. No higher levels of pollutants are predicted outside the SPZ boundary (although it should be noted that the reported ground level concentrations at the boundary may extend beyond the SPZ boundary).

Whilst the modelling results show that the impact of emissions to air on residential receptors (beyond the SPZ boundary) will be at or below applicable Ukrainian limits, the high predicted ground level concentrations (g.l.c.) of particulates is an area of concern. Dust from stockpiles is reported to make up 40% of the predicted incremental increase in g.l.c. of particulates at the SPZ boundary.

It is also noted that estimated background concentrations were used and the model is likely to err on the side of caution, predicting the worst 20-minute concentration levels based on the worst meteorological conditions for emissions at legislative limits.

Maximum g.l.c. of pollutants within the 1 km SPZ boundary will be higher. While there are not reported to be any residential receptors in the SPZ there are two factories producing bricks and lime to the south of the dry-line plant between the plant and Gayi village, Both sites are thought to employ 5-10 people and are operated seasonally (March-December), closing in the winter period, with only security guards present. Workers at these sites will be exposed to pollutants emitted from the plant (although they are outside the SPZ).

The new dry line plant will generate significant road and rail traffic. Road traffic will be routed along the new access road; this avoids the village of Dobryany, with the closest residential properties being about 1km from the road. The air dispersion modelling reported above includes the effects of this transport. Traffic joining the Kiev-Chop highway will increase traffic flows, however, as this is already a busy highway, the impact of additional traffic from the dry-line plant on the road is not considered likely to give rise to significant impacts on air quality.

The increase in rail traffic will likewise give rise to increased combustion gas emissions from locomotives (assuming they are diesel powered). This is likely to give rise to greatest impacts in Shchiretz, where the railway joins the main railway network. There is no available data on the likely impacts at this location, however air emissions are likely to be of less concern that noise impacts. In addition, the use of railway wagons takes product movement off the roads and generates lower carbon dioxide emissions.

It should also be borne in mind that the impacts on ambient air quality from the new plant are far less than those from the existing plant. The production of cement by new dry-line plant in comparison with the existing plant will give rise to much reduced air emissions and substantially improved environment around the locality of the plant, in comparison with the area surrounding the existing plant.

Operational Air Emissions – Further Actions

Particulate concentrations at the nearest dwellings must be re-modelled once measured ambient data is available. Depending on the results of this analysis, further sensitivity analysis will be carried out and further dust abatement controls may be required.

Ground level concentrations of pollutants at workplaces within the SPZ will be established and compared with the identified applicable limits.

The company will establish a network of ambient air quality monitoring points around the perimeter of the SPZ and at other key receptors around the site.

Decommissioning

Levels of dust generated in decommissioning may be higher than those generated during construction due to the 'aggressive' nature of demolition activities such as concrete and masonry breaking and the possibility that on-site crushers will be used to process demolition waste.

Mitigation measures that are likely to be employed will be similar to those proposed for construction. As with the construction phase, the magnitude of dust impacts is expected to be low and of temporary duration if appropriate mitigation measures are used.

Energy Use and Greenhouse Gas Emissions

Construction and Decommissioning

Energy use and greenhouse gas emissions in construction and decommissioning are not considered a significant issue.

Operations

The production of cement uses substantial amount of energy and carbon dioxide is liberated as part of the calcining process. Approximately 62% of CO_2 emissions come from the calcining process, with 38% coming from fuel use. CO_2 emissions from the dry-line plant have been calculated; predicted CO_2 emissions from the dry-line plant are 835.3 kg CO_2/t clinker, or for an annual production of 2.1 Mt cement, total CO_2 emissions would be 1,173,900 t CO_2/year.

Using the same approach, CO_2 emissions from the existing process were 1,163 kgCO_2/t clinker. Assuming the same clinker to cement ratio and electricity use, for production of 2.1 Mt cement total CO_2 emissions would be 1,604,400 t CO_2/year using the existing plant. The saving by using the dry-line process (assuming equal production) would be 430,500 t CO_2/year.

Water resources and hydrology

Construction

Construction activities have the potential to pollute surface waters from the escape of silty and contaminated water from site run-off, de-watering of excavations, escape of fuels, oils, chemicals etc, and sanitary wastewater from the workers camp and effluent treatment plant.

Site drainage will be collected by drainage channels and will be settled in two settlement tanks and oil separators. Excavation dewatering will be pumped to the settlement tanks for treatment prior to discharge.

Polluting materials such as oils, fuels and chemicals will be stored in dedicated storage areas, with secondary containment to contain spills. Sewage treatment will be by packaged effluent treatment plant which will also continue to be used in the operational phase.

Discharge of treated site drainage and treated sewage effluent will be to the un-named stream, via the two existing discharge points used by the existing quarry. Assessment in the OVNS indicates that the concentrations of substances in the discharged effluent to the River Shchirka will be within permitted limits.

Operation

Closed loop cooling water systems will be used for process cooling. This water will not get discharged to surface water or sewer.

Domestic sewage will be treated by packaged effluent treatment.

Surface water drainage is collected and treated as described earlier. Settled sediment will be used as an additive to the raw materials for cement production. Treated rainwater will be used for irrigation of the site, with surplus being discharged to surface water.

During the operation of new plan treated effluent will be discharged to the un-named stream which is the left tributary of River Shchirka. The total maximum outflow from the site will be 241,640 m^3/year; retention tanks have been included in the site design to avoid temporary flooding of the un-named stream. Assessment in the OVNS indicates that the concentrations of substances in the discharged effluent to the River Shchirka are within permitted limits.

Decommissioning

Potential impacts on surface waters and effluent from decommissioning are similar to those arising from construction.

The site drainage network and water treatment plant will be retained for as long as possible to reduce the amount of entrained sediment and potential contaminants present on the site entering watercourses.

Good practice measures will be employed to reduce the risk of escapes of polluting materials (such as oils) used in the decommissioning process itself. This includes the provision of adequate contained storage areas.

Land and groundwater contamination

Construction

The presence of karst features at the site is a potential risk to construction programme and costs. Processes will be developed to ensure that if karst caverns are revealed during construction, all works will be stopped and the Design Company will be informed to advise on suitable corrective.

Construction activities have the potential to release pollutants to the ground and groundwater. Potential sources of pollution include, importing contaminated fill material, and the accidental release of hazardous materials and liquid wastes.

Measures will be taken to prevent any contaminated materials being imported onto the site. Potentially polluting materials, such as fuels, oils, and liquid wastes materials will be securely stored in contained storage areas. In addition, appropriate working procedures will be adopted to minimise the risk of accidental release during delivery to and removal from the storage areas.

Operation

The main potential operational phase impacts on soils and groundwater is from the storage and use of potentially polluting materials. For the operational site this will include solid and liquid fuel and raw material storage, SNCR reagent (urea solution), maintenance oils and solvents, and waste materials.

Bulk raw materials are mostly held in internal storage with hard-surfaced floors to prevent the downward movement of contaminants. The only external bulk storage areas are the coal and winter clinker store. The specification for the base of the coal store is yet to be finalised; it is likely that it will be impermeable hardsurfacing to reduce the movement of contaminants into the underlying ground and groundwater.

As for the construction phase, potentially polluting materials will be stored in storage areas with secondary containment. The design specification for site-wide oil, fuel and solvent stores is to meet Ukrainian and Lafarge standards.

Decommissioning

There is the potential that contaminants present in the ground as a result of spills during operation could be released during demolition, either as windblown dust or mobilised and then enter the groundwater. However, it is expected that any incidents during the operation of the site would be contained, removed and the ground remediated at the time of the spillage. Should any areas of gross contamination be encountered during decommissioning then this must be removed and disposed of at appropriate hazardous waste sites.

The Company will specify low hazard materials in the construction of the facility to minimise the risks connected with the potential exposure of hazardous materials during decommissioning.

Potentially polluting materials will be stored appropriately to minimise the risk of pollution from leaks and spills.

Ecology and Ecological Impacts

Construction

The main direct ecological impact resulting from the construction phase of the project is likely to be the loss of habitat associated with the clearance of the dry-line site, access road, railway and gas pipelines. Other construction impacts will include disturbance due to noise, lighting and vehicle movement. Dust deposition may affect vegetation close to construction activities and haul routes.

The presence of a large construction workforce at the site could have an impact on the ecology of the surrounding area through the removal of vegetation, the capture of fauna and the presence of pets which may predate or pass on diseases to local wildlife.

Operation

Operational impacts are confined to disturbance due to noise, lighting, vehicle movement and human presence. Dust deposition may affect vegetation close to the quarry haul routes and possibly along the access road and railway, although these effects are likely to be localised.

Assessment and mitigation – construction and operational phases

The dry-line site development does not affect any protected areas and is within the requirements of Ukrainian legislation. The construction and operation of the dry-line site will affect an area of land covered by what appears to be relatively unremarkable flora, in an area surrounded by extensive amounts of similar vegetation, which will afford similar habitat for wildlife on the site to move to. In consequence the level of impact on ecology is expected to be low.

It will be a requirement of the ESAP that the Company will undertake site clearance outside bird breeding season where possible, and that trees outside the clearance area are protected up to 2m height.

In order to mitigate the loss of habitat open areas of the finished site and the landscaped perimeter bund shall be covered with topsoil stripped from the site, which will contain the local seedbank. Any additional planting shall be of locally provenanced seed or shrubs.

The company has identified a series of future actions in the ESAP to contact the state regulator to confirm:

- the presence of any designated sites which may be affected by the railway, road, and utility supply lines;
- whether the development is located on or close to any known bird or animal migration routes.
- and conduct an ecological survey of any sections of the railway, access road and gas pipeline which go through any vegetation other than improved or semi-improved grassland (e.g. woodland).

A range of education, monitoring and enforcement measures will be implemented to prevent the construction workforce from damaging plants or animals. The keeping of domestic pets will be prohibited.

Decommissioning

The decommissioning of the dry-line facility and its associated transport facilities and quarries is not expected to have significant negative ecological effects. Before decommissioning commences, an assessment shall be made to determine whether any animals such as bats or birds may have colonised areas of the development. The decommissioning plan shall consider the potential to develop after-uses for the site which encourage biodiversity.

Landscape and Visual Impacts

Construction

Construction activities will involve site stripping and the use of lay down areas, contractor housing, stockpiles, excavations, vehicle and plant movements, large fixed and mobile cranes and the erection of industrial structures. The site will be lit for security at night. These activities are expected to have an adverse impact on the open landscape character of the area, and an adverse visual impact from viewpoints from some of the surrounding villages, stretches of village road and the Kiev-Chop highway.

Mitigation measures that will be adopted include the damping-down of stockpiles, roads and sheeting of lorries to reduce dust plumes. A low berm will be built around the site which will be vegetated; this will reduce some low-level views in to the site, and will also reduce wind entrainment of dust. Similar dust suppression techniques will reduce the impact of visible dust plumes from road and railway line construction.

Operational Phase

The new plant is a substantial industrial development in an expansive semi-cultivated open landscape. The most visible structure will be the preheater tower (118m), surrounded by other industrial buildings and silos of up to 50m height, as well as areas of car and lorry parking, railway sidings and the linear features of the access road and railway. The site will be lit at night during operation and tall structures will have aircraft navigation lights fitted. It will form a new industrial landmark in the vicinity which will be visible for considerable distances.

The impact of the plant on the landscape setting will be moderate to severe adverse; the visual impact on receptors at villages, on local roads and on the Kiev-Chop highway will vary in severity depending on location, distance and intervening landform and vegetation. In some locations, however, the visual impact is likely to be substantial.

The plant layout has been arranged to optimised production and minimise land-take and there is therefore no scope to reduce its size further. The surrounding earth bank and local planting will provide some screening to the lower parts of the plant, hiding plant clutter and vehicle movements to some extent. Site lighting will be selected to minimise light pollution, where practical.

The line of the railway and access road will be new linear features in the landscape. Potential mitigation is to plant sections of their length with trees, in order to match the appearance of other roads and railway lines in the area.

Decommissioning

The removal of the cement plant structures will have a beneficial impact on the landscape. Overall, decommissioning activities are transitory, and are likely to be similar in magnitude to construction effects.

The final stages of decommissioning will be a restoration programme aimed at reinstatement of the cement plant site either to pre-construction conditions or to a (currently unknown) alternative end-use. The development of alternative uses for the site may be subject to landscape and visual assessment as part of the permitting and licensing process.

Noise and Vibration

Construction

Noise levels were modelled for the 2009 OVNS at the closest residential receptors using noise levels for the main sources of noise during construction; the piling units, compressors, pumps and internal vehicle movements. Predicted noise levels at receptors were 49-50 dB(A). These are within the Ukrainian standard for day-time noise 55 dB(A),which applies as construction activities will be limited to daylight hours. Lower noise limits of 50 dB(A) for daytime noise apply to sensitive receptors (schools, hospitals etc); predicted noise levels for the closest receptors are at this level.

Noise impacts from external construction traffic, the construction of the railway, access road and gas pipeline have not been established yet, although these assessments are proposed in the ESAP.

Noise mitigation measures will be used during construction works and will be incorporated into the Environmental Management Plan once the contractor is selected and construction details are known.

Operations

Noise levels were modelled for the 2011 OVNS using operational noise data for equipment at a similar plant in Russia. Building noise attenuation was included in the calculations, as was noise from road transport on the access road and rail transport. Measured background noise levels (including the operation of the existing quarry plant) were included in the assessment. Noise levels were modelled at receptors at the edge of nearby residential areas – the closest was 1100m from the site.

Ukrainian noise standards set limits for night-time noise of 45 dB(A) and daytime noise limits of 55 dB(A), and for sensitive receptors (schools, hospitals etc) lower limits of 40 dB(A) for night-time noise and 50 dB(A) for daytime noise apply.

Predicted noise levels at the nearest residential receptors are in the range 42-46.2 dB(A). These are within the Ukrainian daytime standard for regular residential receptors, although nigh-time noise levels are exceeded at 5 receptors at Dopbryany and Gayi villages. There are not reported to be any sensitive receptors affected by plant process noise emissions.

Noise from transport on the railway was included in the modelling for the village of Popelyany. Predicted noise levels were in the range 42-43.9 dB(A). Again, this is within the Ukrainian standard for regular residential receptors. The only sensitive receptor has been identified as a school; noise levels are within the day-time limit for sensitive receptors (the school is only occupied during the day). No assessment of noise at Shchiretz station has been made.

Assessment and recommendations

The noise assessment indicates that night-time noise limits may be breached at receptors in Dobryany and Gayi villages; in addition noise levels at Gorbachi village and Polplyany village are only 1 dB (A) below the nigh-time limits. The Company is investigating fitting further noise attenuation measures to reduce noise levels below the applicable limits; this is included in the ESAP.

No assessment of the noise impact of construction traffic has been undertaken. As the construction phase will involve substantial truck movements through villages, further assessment of construction traffic noise will be carried out. This is included in the ESAP.

No assessment of the likely noise impact of the railway construction has been made, nor has any assessment been made of the increased operational noise levels at Schiretz station. A requirement to undertake an assessment of construction impacts along the route and operational impacts at Schiretz station is included in the ESAP.

Decommissioning

Noise levels associated with decommissioning activities cannot be established until details of the programme, methods used and plant and equipment are established. Noise mitigation measures will be incorporated into the decommissioning plan.

Waste and materials storage

Construction

Surplus excavated material will be re-used on site, or used as fill for the railway or access road, and the residue used for quarry restoration. Other construction wastes are likely to include waste building materials, steel, metals, wood, cardboard, paper, oils, hazardous wastes and general wastes. There is no available information on amount of waste likely to be produced.

The company will develop and implement a construction phase waste management plan. Measures will be developed to minimise waste generation, and ensure wastes are stored securely. Wastes generated will be segregated and recycled, as far as possible, with residual wastes disposed of using licensed wastes carriers and disposal sites.

Operation

Waste generation from the site will be low. Process wastes, such as filtered dusts and off-spec clinker are recycled back into production throughout the process, making the process highly efficient and reducing waste arisings at source. Waste refractories will also be crushed and recycled back into the process, removing the need to dispose of this waste off site. All other wastes are produced as a result of the operation and maintenance of the process and will be minimised and recycled where there is the opportunity for this.

Wastes arising from transport and the use of the access road and railway are expected to be minimal. Most railway waste will be engineering wastes, including oils and solvents generated at the railway maintenance buildings.

Waste management and recovery and recycling will be controlled by the site waste management plan. Lafarge waste management standards will be applied to waste storage and handling. Designated wastes storage areas will be established, with the use of suitable wastes containers to fully contain the wastes.

Decommissioning

The decommissioning plan will include a waste management plan which will identify the waste minimisation, storage, handling, treatment, re-use, recycling and disposal strategy for each identified waste stream.

Cultural History and Archaeology

Construction

The company have mapped a 50m protected buffer zone around the archaeological protected site. The site layout has been arranged to avoid using the area, which will be left undisturbed.

During construction the protective zone will be surrounded with a metal fence to prevent access and disturbance. All earth works in the locality of the protected site will be supervised by an archaeologist.

The company will implement a chance finds procedure to ensure that if any remains of cultural heritage are found, work is stopped and an archaeological

inspection is carried out. Further actions will then depend on the findings of the archaeological investigation.

In operation and decommissioning the archaeological protected site will remain fenced off.

Transport

Construction and Operation

The impacts of traffic and transport are discussed under the air, noise and landscape sections.

The construction phase will involve substantial truck movements through villages and a consequent increase in the risk of road traffic accidents.

In operation, increased traffic flows present increased risk of accidents, in particular at the junction of the access road with the existing village road (this will be roundabout), provision of pedestrian crossings, and the junction of the access road with the main Kiev-Chop highway (it is noted that this junction design is reported to have been approved by the Ukrainian authorities). This junction will require heavily laden tankers to join a high-speed dual-carriageway along a relatively short slip-road. In addition, lorries heading north will be required to make a U-turn across onto the other side of the dual carriageway approximately 150m from where they join the road; the U-turn point is also over the brow of the hill with limited visibility for following traffic.

The design of the railway will be reviewed to ensure provision for safe vehicular and pedestrian crossing-points is included, as well as adequate barriers to prevent unauthorised access, particularly near settlements.

Actions to carry out a traffic accident risk assessment for construction and operational road traffic, and to carry out an assessment of the access to and safety of the railway line are included in the ESAP.

Decommissioning

The closure of the facility will remove the large numbers of vehicles from the roads and railway traffic taking product from the cement works. Depending on the eventual end-use of the site, some traffic may still use the access road.

No estimates of decommissioning traffic are available, however, the amount of traffic generation is likely to be broadly similar that experienced during the construction period.

Cumulative and Transboundary Impacts

The current OVNS document includes only the dry cement line construction and operation. The assessment in this report has included consideration of additional impacts arising from the access roads, railway, gas supply line and electricity supply line. Later OVNSs will contain further information to quantify the additional impacts associated with these developments - this information was not available at the time this report was written.

A key issue is that the new plant and existing plant will not operated simultaneously, or if they do this will be limited to a very short period (of 3-6 months maximum), during which time production at the two sites will be below full capacity. The combined impact on air quality will be transient, due to the limited period of joint operation, and cumulative impacts should be minimal due to the distance between the plants, and the low predicted additional increment to ground level concentrations of air pollutants predicted 1km from the new site.

The new and existing sites are not visible from each other and nor are they both visible from most, if not all receptors, meaning any cumulative visual impact will be minor or non-existent. Similarly the distance between the sites means that cumulative noise impacts will not be an issue, and the same is true for ecological impacts.

The impact on traffic will be adverse, as there will be more road and rail journeys to and from the new plant, although this is mitigated to an extent by the removal of the existing plant road traffic in the main Kiev-Chop highway due to the existing plant closure (although there will be a interim period of higher traffic during the period of site decommissioning).

Due to the distances to the nearest international boundaries (the closest is 80km to the Polish border) transboundary impacts will be negligible.

Existing Plant Decommissioning Impacts

The environmental impacts caused by decommissioning the existing site are expected to be very similar to those identified for the decommissioning of the

new dry-process line facility. The key difference in the significance of impacts between the new plant and existing plant is primarily due to the proximity of residential receptors.

Air emissions and control measures are expected to be similar to those identified for the dry-process line decommissioning. There is, however, a heightened risk of contaminated materials being contained within windblown dust from the existing site; contamination levels at the existing site are likely to be higher than those from the post-operational new site, as a higher standard of materials handling is expected throughout the life of the new plant; in addition the presence of residential receptors within 100-200m of the existing site boundary means that the significance of impacts will be higher.

Similar mitigation measures for the control of dust shall be employed at the existing site as are proposed for the new site decommissioning. In addition, a pre-decommissioning land contamination assessment will be carried out for the existing site and a decontamination strategy will be developed to ensure that the site is decontaminated to an extent suitable for its eventual end-use.

Impacts on surface waters from the release of sediment laden water, which may include contaminants released by decommissioning, will be mitigated by retaining site drainage infrastructure and effluent treatment plant for as long as possible during decommissioning. The further use of settlement ponds and oil skimmers may have to be examined as site decommissioning progresses.

Measures to prevent the release of substances to ground and groundwater during decommissioning are as proposed for new site decommissioning .The presence of hazardous materials including oils, PCB containing oils, asbestos and chromium bricks at the existing site is also a known issue. A hazardous materials and asbestos management plan will be developed to manage the identification and safe removal of these items during decommissioning.

Noise and vibration caused by decommissioning at the existing site will be similar in intensity to those identified for the new plant decommissioning phase, however, the impacts will be greater due to the proximity of residential receptors. Greater attention will have to be paid to identifying low-noise methods of decommissioning and phasing activity.

Transport levels are unknown and largely depend on how much material will be taken off site.

Impacts on ecology will be limited to disturbance of birds and animals (including bats) which have colonised the existing site buildings. Proposed mitigation is to carry out ecological surveys of buildings and develop a suitable management strategy. Due to the level of development on the site it is likely that any archaeological or cultural heritage sites have already been disturbed, however, the change finds procedure used in the construction of the new site shall be applied to decommissioning of the existing site.

Landscape and visual impacts from decommissioning will consist of the visual intrusion of decommissioning activity and lighting; the level of activity across the site is likely to increase during decommissioning, and this may have a minor additional impact on receptors with views into the site. The eventual end use of the site is not known, however, the removal of the tall stacks and large industrial building will have a beneficial impact on the landscape setting and visual impact.

Socio-Economic Impacts

Employment, Labour and Working Conditions

Construction

A peak of 1,200 workers will be employed during construction. Although most of these will be foreign workers, up to 300 local workers are likely to be employed on the site. This will provide short term local employment opportunity, most likely for unskilled positions.

As the workforce will be primarily foreign, there will then be less of a local labour impact resulting from demobilisation of workers at the end of the construction period. However, the loss of local jobs, together with the closure of the existing facility will leave a number of workers seeking employment at the same time. This is likely to lead to a reduction in household income and associated stress among workers, their families and people whose livelihoods are dependent on the workers.

Construction of the new facility will provide direct procurement opportunities for local, national and international companies. The Company is considering

whether measures can be taken to proactively plan for and provide training to optimise local employment and procurement opportunities.

Operation

Employment within the existing plant is currently 441 people plus a management team of 70. The new plant will employ 250 permanent staff, although it should be noted that not all of 250 staff at the new plant will necessarily be recruited from those at the existing plant; the final numbers will depend on an analysis of the roles which need to be filled.

The new facility will provide direct service opportunities for companies at the local and regional level, however, at the same time, procurement at the existing plant will cease. The procurement demands and changes are yet to be determined.

The Company proposes managing local labour impacts arising from the shift from the existing plant to the new plant by: maximising the transfer of existing staff to the new plant workforce; implementing a redundancy strategy including compensation package and re-training of staff; encouragement of local/national employment opportunities at the new facility through early targeted selection of potential candidates and associated training as well as a clear internal communication and grievance mechanism.

The ESAP includes a requirement for the Company to put in place a local procurement plan to proactively optimise the opportunities for local businesses to support the project.

Operational working conditions at the new plant should be improved compared to the existing plant through a lower level of emissions and noise generation, as well as new and clean working places. The new plant will also operate on an 8 hour working shift system instead of the 12 hour system currently at the existing plant. This represents an improvement in labour conditions.

Decommissioning

Decommissioning of the new plant will likely involve the redundancy and/or relocation of the operations workforce as well as the end of local supplier contracts. This will also have potentially high impact upon the local economy if the plant is still the main employer in the region.

Decommissioning is also likely to involve the mobilisation and then demobilisation of the decommissioning workforce. This may be a local or foreign workforce.

An assessment of the impacts and management strategies for decommissioning is to be undertaken well in advance of this phase in the project. The exit strategy shall aim to minimise local job losses and assist redeployment wherever possible. .

Management of the construction workforce

Potential impacts associated with a construction workforce, especially a foreign workforce, include stress among the construction workforce and local communities. Stress among the construction workforce can be triggered due to the lack of available recreational facilities, long working hours, close living conditions and distance from family and traditional culture. Stress among local communities may be triggered by an influx of predominantly male workers, clash of cultures, an increase in crime, and the spread of communicable diseases among workers and to the local community, a reduction in security and substance abuse, including alcohol.

Impacts can be managed through careful design of the construction camp, its facilities and policies. The ESAP includes a requirement that the Company consider the design of the workers camp to ensure that workers will not be dependent on surrounding communities for any of their needs, and establish a workforce code of behaviour and design working hours to maintain a healthy workforce and good relations with communities.

The Company will establish and publicise a formal grievance mechanism for communities to raise issues of concerns, as part of the Stakeholder Engagement Plan.

Community Health, Safety and Security

The permanent access road will be 1 km from local housing and is unlikely to give rise to significant local health impacts. The temporary construction route will, however, go through local villages. Health impacts may be triggered due to the physical and psychological effects of on-going traffic noise, vibration and reduced air quality in the villages on the temporary construction route, however,

it should be noted that the road will only be used for construction access for about 12 months.

Mitigation measures will put in place to manage and monitor the level of impact including regulating the type of vehicles, traffic flow rates during the day and night, covers for dusty loads and regular monitoring of noise and air quality levels, plus assessment of impact of vibration on properties.

The risk of road traffic accidents is likely to increase, especially during the construction phase given the number of traffic movements and the use of the existing village roads for the first twelve months of construction. The ESAP includes an action to carry out a traffic risk assessment in order to further identify the significance of likely impacts and develop appropriate mitigation and management measures.

Land Acquisition, displacement and socio-economic issues

Though the new site requires no physical relocation of buildings, agricultural livelihoods on the new site will be impacted. The land has been leased from the Ternopiliya village council and one of the conditions of the lease was a parallel transfer of ownership of disused quarry land back to the village council to be used for agricultural purposes.

The development of the new dry line plant will not directly impact any residential proprieties and no households will be moved. The development will impact on land used by local residents for agricultural purposes and a land exchange has been agreed (with Ternopiliya village council) in full compliance with national, and EBRD requirements. Actions will include disclosure of relevant information to affected persons and communities to facilitate their early and informed participation in decision making processes, establishment of a grievance mechanism, completion of a census and social economic baseline assessment within a defined affected area and preparation followed by implementation of a relocation action plan or livelihood restoration plan.

The ownership and land use status of the project infrastructure routes is currently unknown. This will be investigated thoroughly and any relocation or displacement process will be undertaken in full compliance with national and EBRD requirements.

An assessment will be made regarding any disruption or loss of access to 'rights of way' either during construction or operation phases.

Economic Distortions

Temporary inflation in the cost of local goods and services may be triggered by the increased demands of the construction workforce. Mitigation measures considered include monitoring local prices to set benchmark prices for procurement.

Social investment

The Company's social investment strategy will beformalised and details of any funds, focus areas and the application process is publicised to manage expectations.

Environmental and Social Impacts Summary Tables

The tables below summarise the findings of the assessment. The environmental impact rating system used is indicative, based on Atkins' judgement of the likely impacts after mitigation measures are employed. The use of a rigidly defined set of criteria is not considered appropriate as they do not allow ready comparison between impacts affecting different environmental media. The environmental impact rating used is shown below:

Table 5 - Impact Rating Scale

Severe Adverse
Moderate Adverse
Minor Adverse
Negligible / Nil
Minor Beneficial
Moderate Beneficial
Substantial Beneficial

Table 6– Summary of Key Residual Construction Impacts

Impact Group	Impact	Residual Impact Rating
AIR	Dust emissions (dry-line site)	Minor adverse
	Dust emissions (railway, gas pipeline and access road)	To be determined
	Dust and vehicle exhaust emissions (temporary construction road)	To be determined
GROUND & WATER	Importation of pollutants in fill materials and accidental release of pollutants	Minor adverse
	Increase of sediment load in watercourses	Negligible
WASTE	Waste generation and storage	Negligible
ECOLOGY	Loss habitat (dry-line site)	Negligible
	Loss of habitat (access road, railway and gas pipeline)	To be determined
	Impact of foreign workforce on ecology	Minor adverse (depending on implementation)
LANDSCAPE & VISUAL	Impact the landscape character and visual amenity	Minor to moderate adverse impact
CULTURAL HERITAGE	Damage to archaeology (dry-line site)	Negligible
	Damage to archaeology (railway, access road or gas pipeline)	To be determined
NOISE & VIBRATION	Noise (dry-line site)	Negligible to minor adverse
	Noise (traffic through local villages)	To be determined
	Noise (access road, railway and gas pipeline)	To be determined
SOCIO-ECONOMIC	Rapid demobilisation of construction workforce	Moderate Adverse
	Short term employment of 200-300 construction workforce	Moderate beneficial
	Health issues associated with presence of construction workforce	Negligible to minor adverse
	Health impacts from traffic	Moderate adverse
	Road traffic accidents	To be determined
	Agricultural livelihood displacement at new plant site	Negligible / nil
	Further livelihood displacement associated with infrastructure routes	To be determined

Impact Group	Impact	Residual Impact Rating
	Disruption or loss of access to right of way	To be determined

Table 7 – Summary of Key Residual Operational Impacts

Impact Group	Impact	Residual Impact Rating
AIR	Combustion gas emissions (dry-line plant)	Minor adverse
	Particulate point-source emissions	Moderate adverse
	Fugitive dust emissions from the dry-line plant.	Negligible to minor adverse
	Emissions from road transport	To be determined
	Emissions from rail transport	To be determined
SURFACE WATER	Sediment and pollutant load in surface waters	Negligible/Minor adverse
	Emissions to surface waters	Negligible/Minor adverse
	Accidental release of pollutants	Minor adverse
GROUND & GROUNDWATER	Groundwater depletion.	Negligible
	Greenhouse gas emissions (improvement from existing plant)	Substantial Beneficial
WASTE	Waste management and storage	Minor/Moderate Adverse
ECOLOGY	Dust deposition on vegetation	Minor Adverse
	Disturbance of wildlife (dry-line site)	Minor Adverse
	Disturbance to wildlife (railway)	To be determined
LANDSCAPE & VISUAL	Impact on the landscape character and visual amenity	Moderate adverse
CULTURAL HISTORY	Damage to archaeological site (dry-line site).	Nil
	Damage to archaeological sites (railway, access road or gas pipeline)	To be determined
TRAFFIC	Increased traffic on local roads (congestion, noise)	Minor Adverse
	Increased traffic on local roads (accidents)	To be determined
	Increased railway traffic	To be determined

Impact Group	Impact	Residual Impact Rating
NOISE & VIBRATION	Noise from cement plant	Regular receptors - Moderate adverse
		Sensitive receptors- to be determined
	Noise from traffic on the access road	Regular receptors - Moderate adverse
		Sensitive receptors- to be determined
	Noise from railway	To be determined
SOCIO-ECONOMIC	Redundancy of existing plant workforce	Moderate adverse
	Health impacts from traffic	Negligible/nil – minor adverse
	Local procurement	To be determined
	Disruption or loss of access to right of way	To be determined
	Social investment	To be determined

Table 8 – Summary of Key Residual Decommissioning Impacts

Impact Group	Impact	Residual Impact Rating
	Emission prevention	Minor Beneficial (new and existing sites)
AIR	Dust emissions	Minor adverse (new site)
		Moderate adverse (existing site)
WATER	Discharge of silty and contaminated water to water bodies.	Minor adverse (new site)
		Moderate adverse (existing site)
GROUND & GROUNDWATER	Ground and groundwater contamination by polluting substances	Minor adverse (new site)
		Moderate adverse (existing site)
ECOLOGY	Disturbance of wildlife	Minor adverse (new and existing sites)
LANDSCAPE AND VISUAL	Impact on the landscape character and visual amenity	Minor beneficial (new and existing sites)
WASTE	Waste generation and management	Moderate adverse (new and existing sites)
NOISE AND VIBRATION	Noise and vibration from decommissioning	Unknown, likely to be negligible to minor adverse (as for construction phase) (new site)

Impact Group	Impact	Residual Impact Rating
		Unknown, likely to be moderate to severe adverse (existing site)
SOCIO-ECONOMIC	Redundancy of temporary decommissioning workforce	Moderate adverse (new and existing sites)
	Redundancies of plant workforce	Moderate adverse (existing site)
		To be determined (new site)
	Return of agricultural and private land for normal use *(new site)*	To be determined

Annex 1 Diagram of a generic dry-line cement production process.